ADEQ Arizona Department of Environmental Quality

Memorandum

FPU:08:069
Date: September 27, 2007

To: Nicole Coronado, Project Manager, Federal Projects Unit

From: David M. Haag, R.G., Project Hydrologist, Federal Projects Unit

Subject: Review of Technical Memorandum, Regional Groundwater Flow Model, Motorola 52nd Street Superfund Project, Operable Unit 3, Arizona Public Service Company, prepared by AMEC Earth and Environmental, Inc., dated June 11, 2007.

The project hydrologist for the Motorola 52nd Street Superfund Site (M52) has reviewed the above referenced memorandum documenting the proposed approach and methodology to create a groundwater flow model from approximately 32nd Street to the east, 35th Avenue to the west, the Salt River to the south, and Thomas Road in the northeast to McDowell Road to the northwest. It appears the primary focus of the model is to be evaluating the influence of Salt River flooding on groundwater in OU3 and specifically on groundwater beneath the APS facility. The project hydrologist has the following comments.

1. The memorandum states in Section 1.1 Model Objective that MODFLOW 2005 will be used. The memorandum should provide rationale as to why MODFLOW 2005 would be used as compared to MODFLOW 2000. The memorandum should state which modeling package (i.e., Visual Modflow or Groundwater Vistas), if any, would be used.
2. The memorandum should provide additional rationale in Section 1.1 Model Objective as to why the model is being developed and why the model is not intended to be used to simulate chemical fate and transport.
3. The memorandum should include the following American Society for Testing and Materials (ASTM) guide in the bullets included in Section 1.1 Model Objective *"Guide for Developing Conceptual Site Models for Contaminated Sites"* (ASTM E1689-95). This guide should be included since the conceptual site model (CSM) is the base on which the groundwater flow model is developed.
4. In Section 2.1 Geology the memorandum should provide documentation that indicates that the Middle Alluvial Unit (MAU) and the Lower Alluvial Unit (LAU) are present within the OU3 area.
5. Section 2.3.2 Historical Groundwater Fluxes and Magnitude discusses interpretations of Salt River flow on groundwater based upon analysis provided by CH2M Hill and Hargis and Associates from Honeywell's Focused Remedial Investigation (FRI) report dated December 2005. The memorandum states that 800 cubic feet per second (cfs) is the flow rate that determines the impact of Salt River flow on recharge. The memorandum should also discuss how the duration of the event(s) may affect recharge. The memorandum should also discuss how flows of less than 800 cfs, i.e., a monsoon event, may impact the aquifer immediately after a larger, i.e., winter/spring, event.
6. The memorandum should also state how the azimuths that were presented Honeywell's FRI report were affected by the Honeywell bedrock ridge.

7. Section 2.2.3.2 Historical Stress Periods states that there have been eight flood events that had duration of greater than 30 days with a flow rate greater than 800 cfs. An additional stress period should be added that involves pumping. Based upon the East Lake Park Site Inspection report (1984), the Arizona Department of Transportation (ADOT) installed nine dewatering wells along 21st Street between University Drive and Buckeye Road in approximately 1984 so ADOT could install a stormwater drainage tunnels for the Papago Freeway. The wells were reportedly to pump approximately 13,500 gallons per minute (gpm) or 60 acre-feet per day (ac-ft/d) for approximately one year. The pumped water was disposed of in the Salt River. Additionally, the report states that a similar tunnel construction project along Central Avenue was planned. Based upon the report, the Central project was to take place along Central Avenue from the Salt River to Van Buren Street using 14 dewatering wells. The 14 wells were to pump 21,000 gpm and approximately 41,000 acre-feet (ac-ft) of water was to have been removed. However, the report and file does not mention whether dewatering took place. These incidents should be investigated and put into the model.

8. In Section 3.2 Model Boundaries the memorandum should provide rationale as to why a constant head boundary was chosen for the down-gradient boundary and why a general head boundary was chosen for the up-gradient boundary.
9. Section 3.3 Hydrostratigraphic (HSU) Units states that the currently identified subunits, Shallow, M1, M2, and Deep Zones, in the UAU will not be modeled. These units should be included in the model. It should be noted that there is inadequate hydraulic conductivity, specific yield, and other hydraulic data from the area planned to be modeled.
10. The last bullet in Section 3.3 Hydrostratigraphic (HSU) Units states that the bedrock will not be modeled. Bedrock is an important unit in both OU1 and OU2. While the hydraulic gradients do not appear to be significant, as compared to the alluvium, there is groundwater movement and contamination within the bedrock. The bedrock should be included in the model, at least to the known depth of contamination.
11. As stated in Comment #8, the first paragraph in Section 3.4 Model Discretization should state that the UAU should be subdivided.
12. Section 3.5 Initial Model Input states "The final numerical groundwater model input parameters will be based on the model calibration process." This is not correct. The input parameters should be based upon data collected in the field, not on model calibration.
13. The next several sections, 3.5.1 Hydraulic Conductivity; 3.5.2 Porosity; 3.6 Water Balance; and 3.6.1 Recharge should use data collected from more recent field investigations, if available, rather than data presented in the Central Phoenix Plume Model (CCPM).

If you have further questions, please do not hesitate to call me at 1-4455.

DMH/dmh